A Poster 1

Hooks for Hanging Huge Amounts of Information

TAMARAH ADAIR, *Baylor University*

One of the main challenges of teaching an introductory course in biology is determining the main learning objectives from the enormous amount of information in the biological sciences. After that decision has been made, the next challenge is how to keep sight of these big picture objectives while giving students enough information to learn the foundations of biology, and finally the challenge of how to make connections between the topics. One problem I have noticed in my students is that they try to make long lists or flashcards of all this information. Learning theory tells us that this type of memory work does not build connections or long-term knowledge. Therefore, I try to find examples with visuals that both "hook" or engage the students in the lecture (build interest) and help students build their own mental "hooks" to hang their knowledge in a way that builds a lasting framework for learning. The purpose of this poster is to share several ideas and to generate discussion to develop new ideas and ultimately improve teaching and learning.

B Poster 2

Using Pre-Lecture Assessment to Enhance Student Learning

ANDREA S. ASPBURY, Texas State University-San Marcos

In our major's Biology courses, we have several obstacles to overcome in preparing students for success in later core-curriculum courses. Two of the obstacles include: (1) high DFW rates, AND (2) large lecture sections with diverse student preparedness. In an attempt to improve our DFW rate, as well as to reach as many students as possible in the course we implemented MasteringBiology into the second semester curriculum in fall 2008. In one of the sections (of two offered each semester), beginning in fall 2010 we began to utilize a pre-lecture assessment that consists of a short multiple choice quiz in MasteringBiology that covers the material to be lectured on in the upcoming week. These "reading quizzes" counted for 30% of the MasteringBiology grade (or 6% of the total course grade). I compared the mean final grades between the sections with the reading quizzes to those without. The students in the sections with the reading quizzes performed significantly better than those in sections without. The success of implementing the reading quizzes likely hinges on the active involvement of the instructor in using the results of student performance on the quiz in shaping the direction of the lectures.

A Poster 3

Faculty Members Transformed in Course Transformation Project

RUTH BUSKIRK, ANITA LATHAM, MARHTA MAAS, JENNIFER MOON, K. SATHASIVAN, S. M. SHANKLAND, *University of Texas*

In response to a Provost-sponsored initiative, we are redesigning our two-semester majors introductory biology lecture course to make classes more student-centered and interactive and to increase student success and retention. Our objective is to develop measurable learning outcomes and align them with problem-solving activities and assessments. The challenges are for faculty to lecture less and for students to rely less on memorization and take responsibility for their own learning. After one pilot semester, the greatest changes have occurred in the faculty. Creating a consensus list of learning outcomes was imperative. Many active learning resources are available, so our task was to organize them and adapt them to our objectives. Being flexible and sharing feedback were essential parts of the process. With practice, and with emphasis on teaching concepts instead of traditional lists of topics, adopting a student-centered classroom becomes easier. Despite the extensive time commitment, seeing the students respond to our learning exercises is addictive. We cannot go back.

B Poster 4

Adventures in Teaching: Flipping the Large Intro Class

JUNG H. CHOI, *Georgia Institute of Technology*

In fall 2011, I taught two large lecture sections of our Intro Biological Principles course using an "inverted" or "flipped" classroom model. I recorded lecture content using screen capture video, and uploaded to our course management site (T-square = Sakai) and to YouTube, for students to view before class. Class sessions started with clicker questions addressing critical concepts from the lecture videos. The majority of class time was used for students to work in small groups applying many of these concepts to problems and case studies. I will present examples of these in-class exercises, feedback from students, data on student performance, and some reflections on going forward. More details may be found on my blog: http://jchoigt.wordpress.com/ the tab "Learning Resources for Biology" has posts outlining many of my in-class activities. My rationale is explained here:
http://jchoigt.wordpress.com/2011/08/24/foray-into-the-deep-end-of-active-learning/
Initial student reactions are here:
http://jchoigt.wordpress.com/2011/10/13/taking-some-lumps-in-the-no-lecture-model/

A Poster 5

A New Approach toward Teaching Introductory Organismal Biology

TODD J. COOKE, **JEFFERY S. JENSEN**, KRISTI L. HALL, JANET E. COFFEY, JESSICA E. WATKINS, EDWARD F. REDISH, *University of Maryland*

BSCI 207 Principles of Biology III: Organismal Biology is designed as a part of our introductory biology

sequence to present the fundamental knowledge of organismal biology, i.e., the structure, function, and diversity of all organisms. BSCI 207 takes a principles-based approach to organismal biology, as opposed to the traditional approach of "the forced march" through the diversity and physiology of major phyla. This course also explicitly incorporates relevant mathematics, physics, and chemistry in accordance with the guidelines of the BIO 2010 initiative. CCLI funds are being used to create active engagement exercises to help students master challenging topics, such as biological energy flow, tree thinking, endosymbiosis, electron transport, scaling, and biomechanics that have proven difficult to teach in large lecture settings. These exercises are generally composed of two parts: 1) small-group, in-class exercises intended to guide the students toward using their prior biological knowledge to build conceptual, mathematical, and/or physical models of major principles, and 2) group homework requiring the students to apply those models toward solving problems. However, we are observing that many students find it difficult to switch their learning efforts from acquiring isolated facts about different organisms to reasoning from broad principles applying to all organisms. Thus, we are using pre-post attitude surveys, individual interviews, and videotaped class and group sessions to characterize BSCI 207 student learning attitudes and behaviors in the attempt to develop more effective teaching strategies for this class as well as to compare general features of introductory biology student learning with what has already been documented in introductory physics classes.

B Poster 6

Trading the Pen for the SWoRD

LYDIA B. DANIELS, *University of Pittsburgh*

Being able to express oneself well in a written text is a critical skill that is weak in many students as they start college. Lack of effective writing skills puts students at a disadvantage as they progress though our curricula and are often faced with open-ended performance assessments such as essay exams, lab reports and other forms of written assessment. Ideally, the curriculum would provide for writing instruction and practice beginning in the introductory class that would become progressively develop discipline specific skills such that, by the time the student was senior she/he would have acquired the ability to communicate on a professional level. The reality is that with ever-increasing class size and the perception that introductory classes must provide students with content instruction, teaching basic writing skills, such as learning how to paraphrase text to avoid plagiarism and to write effective summaries of scientific text, such as textbooks or articles from the literature, is not high on the priority list primarily because of the demand that providing feedback would put on the faculty and teaching assistants. One solution is to rely on peer-feedback and assessment. SWoRD (**S**caffolded **W**riting and **R**ewriting in the **D**isciplines) is a web-based reciprocal peer evaluation system that develops student skill in peer review and assessment. Students submit documents to SWoRD, which assigns the paper to 3-5 peers, who read the paper and assess the work using criteria set by the faculty member. The author then revises the paper based upon peer feedback.

The authors also assess the quality of the peer review in terms of its helpfulness in the revision process. Research on the validity and reliability of peer grades generate by SWoRD show that the practice is as valid and reliable as expert grading if 4 or more student reviewers are assigned to a single paper. Thus, it is possible to support writing practice and skill development in very large classes.

A Poster 7

Engaging Students in Critical Analysis and Independent Research

JEAN HEITZ, *University of Wisconsin, Madison*

Many studies over the past 20 years have indicated the need to improve both the general level of science literacy among our students and to increase the number of students electing science as a career. Exactly how science literacy is defined is debatable. My nonstandard definition of science literacy is having the ability to critically analyze and evaluate information in order to make reasonable decisions.

If students are to develop this type of science literacy they must be given multiple opportunities to critically analyze and evaluate information. In our introductory biology 151 and 152 labs we require students to:

- find and review and critically evaluate background literature
- design and conduct experiments
- analyze information gained and
- communicate what they find in scientific format.

These experiences to lead up to a semester-long experience in either mentored experimental research or research and analysis of an open question using data-mined from existing literature.

This poster highlights:

a) mechanisms we use to place 500 students/year in mentored research

b) data on their retention in research.

c) methods we developed to teach students how to mine data from the literature and critically analyze it, i.e. how to develop a meta-analysis.

B Poster 8

Using MasteringBiology Effectively – and Measuring the Results

CHRIS HESS, *Florida State College at Jacksonville*, BRIAN BUCKLEY, *Pearson*

When considering whether to implement a new pedagogical technique in any course, it is useful to consider the costs and benefits to both students and the instructor. MasteringBiology, with nearly half a million student users, offers you a chance to save time by auto-grading assigned homework, as well as giving you an unparalleled opportunity to understand how well your students are comprehending the material before you get to high stakes exams. For your students, it can help bring weak students up to speed on material you wish they already knew before taking your course in addition to offering them abundant opportunities to practice higher level critical thinking skills such as graph interpretation and concept synthesis.

We will discuss MasteringBiology best practices, including content selection, grading and presentation settings, and using the gradebook and diagnostics to improve student engagement and motivation that can help you maximize the benefits and minimize the time costs associated with using MasteringBiology. Lastly, we will discuss opportunities to design and implement MasteringBiology efficacy studies, and will present examples of data-supported cases of improved student learning. Bring your study ideas!

A Poster 9

Graduate Teaching Assistant Training and Curriculum Development

LORI KAYES, ROBERT MASON, JESSICA WHITE, SARAH EDDY, ***Oregon State University***

Graduate Teaching Assistants (GTAs) for General Biology for Majors have participated in a teacher training course as part of the GTA responsibilities for the last six years. Funded by a Howard Hughes Medical Institute grant, the Graduate Teacher Training Program provides weekly one hour sessions of pedagogy and mentoring by a professor in Education. Developed to address GTAs' limited classroom preparation and their self-reported knowledge gaps with respect to instructional techniques and pedagogy, the training program focuses on various topics such as how to engage students in critical thinking, deal with difficult teaching situations, and grade more effectively. Pre- and post-program assessments have shown that GTAs have found this training to be beneficial for both their time as GTAs and their career preparation. From this program, GTAs developed a graduate-level course focused on designing undergraduate laboratory curriculum. The curriculum course is led by four General Biology GTAs interested in biology education. Participating graduate students spend half their time learning about education philosophy and strategies and remainder of their time developing curriculum to be implemented in the General Biology laboratories. Completed laboratories are piloted during the summer session and, if successful, implemented into our yearly laboratory curriculum. Successful laboratories have been assessed for effectiveness and presented at biology education conferences. Using expert GTA knowledge has resulted in innovative and discovery-based labs that focus on modern methodologies and current issues and increase active learning.

B Poster 10

Development of Inquiry-Based Problem Sets to Reinforce Key Concepts in Molecular Cell Biology

DONNA KOSLOWSKY, *Michigan State University*

We have a real need to develop the ability of our students to evaluate scientific evidence, to increase their logical problem solving skills and to reinforce their understanding of key biological concepts. Using a Faculty Learning Community (FLC), MSU faculty across a wide range of Departments, worked together to

develop data-driven problem sets to allow for more active inquiry and in-depth discussion in large classrooms. The goals of the FLC were to: 1) Identify key concepts in cell biology/biochemistry that are difficult for many students; 2) Develop inquiry-based problems that reinforce the identified key concepts; 3) Develop clicker-based problems/discussion/logistics strategies that allow for the use of the problem sets in a large classroom settings (i.e. >300 students). In addition, by combining faculty from both Introductory and Advanced (400 level) Cell Biology courses, we coordinated the development of problem sets that were useful at multiple levels of instruction.

A Poster 11

Transformed Pedagogies: Encouraging and Enabling Student Active Learning in Introductory Biology using Just-in-Time Teaching

KATHLEEN MARRS, *Indiana University Purdue University, Indianapolis*

The Just-in-Time Teaching (JiTT) strategy was developed at IUPUI, and is currently used by STEM faculty nationwide, including in introductory Biology at IUPUI. At the heart of the JiTT pedagogy are web-based Warm Up assignments that set up a feedback loop between time in class and time out of class to create opportunities and promote deep learning in the classroom and course. I will discuss how JiTT employs a number of pedagogical strategies to make each course relevant to student's lives, maximize the efficacy of the classroom for learning benefit, emphasize teamwork, communication skills, and build a sense of community. The development of undergraduate Peer Mentors experienced in using JiTT further extends opportunities to encourage active learning in as a transformed teaching and learning pedagogy.

B Poster 12

Core Concepts in Physiology

JENNY MCFARLAND, *Edmonds Community College*

Using faculty surveys, we have identified the important core concepts of physiology that physiology students should understand and be able to use. These core concepts can also serve to guide student learning of physiology, especially animal physiology, in the introductory biology sequence. We have 'unpacked' three of the most important core concepts (Flow Down Gradients, Homeostasis and Cell-Cell Communications) into their component ideas and thereby created a conceptual framework for each. We have identified some misconceptions associated with these core concepts and linked these to our unpacked conceptual frameworks. We will use the conceptual frameworks and the misconceptions to develop a conceptual assessment of physiology (CAP) instrument (i.e., a concept inventory). This poster will (1) list the core concepts that have been identified as important in physiology education (2) share a conceptual framework for the core concept of homeostasis that can help structure student learning, (2) explore common student misconceptions that interfere with students' conceptual understanding of homeostasis and (3) demonstrate how misconceptions can be used in assessment of students' conceptual understanding of homeostasis.

A Poster 13

Catalytic Grant 2011: The Efficacy of Testing Groups on Storage and Retrieval in Introductory Biology

REBECCA ORR, *Collin College*, PUSHPA RAMAKRISHNA, *Chandler Gilbert Community College*

Students often complain about their perceived disconnect between the time and effort spent studying and their subsequent performance on tests. Dr. Robert Bjork's research asserts that retrieval of stored information acts as a memory modifier, and that using tests as learning events creates "desirable difficulties that enhance learning" (Bjork, 2011). We studied the effects of giving pre-exam quizzes using an online homework platform to determine if an effective learning opportunity was created for students to practice information retrieval in a major's biology course. Students that consistently took the pre-exam quizzes were more successful on exams than students that did not take the pre-exam quizzes. There were significantly positive correlations between students' quiz grades and exam grades. The benefit of quizzing is not limited to "strong" or "weaker" students, as exam grades appear to increase by 1.5-3 points for every 1 point increase in quiz average, depending on the student. Compliance with the quiz requirement was lower than expected in "Non-Honors" sections, decreasing throughout the semester despite the fact that quizzes were a required portion of the course. Students were not overwhelmingly positive about the introduction of this "difficulty", as they found it inconvenient and discouraging when they did not do well. This is in contrast to our observation that those who consistently took pre-exam quizzes maintain higher exam averages than those that did not. Student perception as to what is helpful to them does not always match the reality of what is most effective in maximizing student outcomes. Pre-exam quizzing seems to be an effective way to increase student performance on exams, and quiz average serves to give students feedback as to potential exam performance.

B Poster 14

Why do students do better in an online section than a classroom section?

JOHN M. PLEASANTS, *Iowa State University*

Student performance on identical tests in non-majors biology was compared between an online section (taught by myself) and a traditional face-to face large lecture (taught by my wife). Students in both sections viewed similar PowerPoint presentations while listening to lectures. We noted that each semester the students in the online section scored five percentage points higher than the classroom students. I investigated several possible causes for this difference: 1) instructor, 2) student behavior and 3) student demographics. To examine instructor differences I guest-lectured in the classroom section for one test unit. Students test scores were still higher in the online section. To examine student behavior I focused on attendance and use of practice quizzes. Both of these were highly correlated with individual performance on tests but neither was significantly different between the two sections. There were more upperclassmen in

the online course and upperclassmen generally did better than lowerclassmen. However, even taking this into account, online students still scored higher on tests. It seems there is something about the online experience that causes students to perform better. What that is remains to be identified. It could be that the short (20-30-minute) online lectures are more conducive to learning than the 75-minute classroom lectures, perhaps because student attention span is not exceeded. Students may also be more attentive during online lectures because they can access them at a time of the day of their choosing when they are more alert.

A Poster 15

Getting Students to Think Like Scientists: A Re-Design of an Intro Biology Course

FIONA RAWLE, *University of Toronto*

We recently re-designed our introductory biology course and implemented a multi-pronged approach to emphasize the scientific process and to teach students to think like scientists. The redesign consists of: (A) a “Thinking Like a Scientist” introductory lecture; (B) “Science vs. Pseudoscience” in-class examples; (C) guided case studies in tutorial sections; (D) active learning exercises in lecture; and (E) incorporation of inquiry based labs. This poster session will include examples of the above re-design, and will detail strategies that were used to encourage students to understand, and participate in, the scientific process. We are currently developing a concept assessment tool that evaluates (A) scientific thinking processes and (B) nature of science concepts. This new concept assessment tool will assist in the evaluation of this course re-design.

B Poster 16

How Undergraduate Teaching Assistants Changed My Approach to Teaching

AHNYA REDMAN, *West Virginia University*

It started out as a simple business arrangement -- undergraduate teaching assistants graded papers in my large-enrollment courses in exchange for course credit -- and it was mutually beneficial from the start. In my impossibly large courses, I was able to assign graded in-class work that my students would take seriously (thereby learning something from it); and the TA's got an easy A and a second pass through a course that would help them prepare for the MCAT. But as I became concerned that the TA's were not getting as much out of the experience as they could, and I invited them into the planning process, it morphed into something completely different. These TA's are truly part of a teaching team, and they have offered more to the course than I could ever have imagined. Some of their contributions include wildy-popular weekly review sessions, a class Facebook page, imaginative assignments, exam questions based on their own misconceptions (which I never would have imagined on my own) when they took the class, and a wealth of unexpected and extremely useful feedback. My class will never be the same.

A Poster 17

Assessment of Learning Outcomes and Suggested Modifications for Improvement

LEENA SAWANT, *Houston Community College System, Southwest*

The student community at Houston Community College is diverse and they come with wide range of abilities. In order to follow student performance in all our classes, we decided to test all our general biology and anatomy physiology students with a common assessment. All students enrolled for general biology, Anatomy and Physiology were each given a departmental final with 50 questions all selected based on blooms taxonomy and discipline approved program and student learning outcomes for the courses. These assessments helped us identify topics that were difficult for students to understand and retain. Once we identified those topics our aim was to inform all instructors to focus and emphasize on these topics during their lecture and use active learning, pop quizzes and Mastering Biology. We also decided to record our lectures for these topics so that they are available to students outside the class in addition to the animations and videos available on Mastering Biology. The plan is to do the same for all majors' biology courses.

B Poster 18

Understanding Evolution Evolves: A Web-Based Resource for Teaching Evolution

JUDY SCOTCHMOOR, ANNA THANUKOS, **LISA URRY,**
Understanding Evolution Teacher Advisory Board

Since 2004, Understanding Evolution has provided a wide range of scientifically and pedagogically vetted evolution education resources through an engaging and freely accessible website. Since then our audience has grown well beyond the K-12 teachers originally targeted by the site. The University of California Museum of Paleontology, in partnership with the American Institute of Biological Sciences and the National Evolutionary Synthesis Center, is responding to the needs and requests of this broader audience with updates to the site that:

- **target undergraduate instructors**, expanding our resources to account for the unique needs of this audience
- **incorporate authentic scientific data** to develop students' scientific thinking skills
- **encourage the integration of evolution** throughout the biology curriculum
- **develop community interactions** and an exchange of ideas and information among instructors of evolution
- **respond to new research** on the teaching and learning of evolution

A Poster 19

Using a Meiosis Concept Inventory to Assess Teaching Effectiveness

JOAN SHARP, *Simon Fraser University*

Most general biology students have misconceptions about the structures and processes of meiosis. Meiosis is a key foundational topic, as students who do not understand meiosis will have difficulty with Mendelian and chromosomal genetics. University of British Columbia's Q4B (Questions for Biology) project has developed a validated meiosis concept inventory that can be used to measure student learning gain for this key topic. I used the Meiosis CI to assess the effectiveness of activities designed to increase student understanding of meiosis.

B Poster 20

AP Biology: Connecting Science Practices to Essential Knowledge

Peggy Skinner, *The Bush School*

The AP Biology Curriculum is changing significantly. The revision will be in effect in the fall of 2012 with thousands of students and teachers working with changes in content and science practices. Based on recommendations by the National Research Council and funded in part by the National Science Foundation, these changes may be one of the biggest impacts on science education reform in our lifetime. Big ideas, enduring understandings, essential knowledge and science practices are woven together to present clear learning objectives for students and teachers.

A Poster 21

Use of Polymer Clay Puzzles to Enhance the Learning of Cellular Structure and Function in Community College Students Taking Introductory Biology

GAIL A. TOMPKINS, *Wake Technical Community College*

Kinesthetic learning allows students to use multiple senses when learning cell structure and function. The hypothesis was: Students who use polymer clay puzzles in addition to traditional lecture-discussion formatted classes will score higher when given a test to assess their knowledge of cell structure and function. Instructors teaching multiple lab sections use the polymer clay puzzles with half of their lab sections and used only traditional lecture format classes with the remaining sections. Following the completion of the unit of study all students were administered an exam to assess mastery of the subject. Students who were included in the experimental group, using the models, scored better on the test of cellular structure and function than the control group who did not use the models. Using kinesthetic teaching methods enhances student retention of the information.

B Poster 22

Challenge Questions: Using Biology's Version of Problem Sets in Peer Tutoring

AMY CHENG VOLLMER, *Swarthmore College*

The use of Challenge Questions in our introductory biology course has been an effective way for us to deal with heterogeneity in student background. One introductory biology course at Swarthmore is open to prospective majors and non-majors. It is a 2-semester sequence with three weekly 50-minute lecture periods, one weekly 3-hour laboratory session, and is team-taught by four faculty members each semester, with assistance from laboratory instructors. Biology 001 is Cellular and Molecular Biology, where the predominant theme is genetics; Biology 002 is Organismal and Population Biology where the predominant theme is evolution. To provide encourage students to keep up with the material and to develop a mastery of concepts, the faculty lecturers provide Challenge Questions. These are the equivalent of problem sets in chemistry or calculus, where students apply what they have learned in class to solve problems/answer questions. Challenge Questions are designed to be integrative and difficult and we strongly encourage students to work on the questions in study groups before attending the weekly group peer tutoring sessions. Peer tutors for the course attend lectures and are instructed weekly about answers to the Challenge Questions and are provided information about pedagogy and student learning.

A Poster 23

Recitation as an Integral Part of the Revised Majors' Biology Curriculum

ANDREA WEEKS, *George Mason University*

The Biology Program at George Mason University revised its core undergraduate curriculum in 2011 to achieve two ends: to update the essential set of concepts and skills each student receives and to transition students more quickly to upper-division courses directly related to their specific interests. The Program identified evolution as a central concept for the new curriculum and the ability to analyze, interpret and communicate scientific data as the skill most in need of strengthening among our majors. As a consequence, the Program created two large-enrollment, five-credit majors' courses (>200 student/semester) that incorporate weekly small group recitation sections (<30 students each) to achieve these new curricular goals. Ecology and Evolution (BIOL308) and Biodiversity (BIOL310) use recitation sections differently but each includes guided discussion and writing assignments that engage students beyond the standard biology lecture and laboratory format. The goal of this presentation is to share the logistics of managing these recitation activities across a hyper-diverse student population and multiple graduate teaching assistants and to outline the Biodiversity teaching experiments that provide the raw data for analyses completed in recitation.

B Poster 24

Collaborative Testing Does Not Improve Content Retention in Intro Biology

MICHELLE WITHERS, HAYLEY LEIGHT, *West Virginia University*

Collaborative testing has been shown to improve student performance in several studies (Sumangala et al., 2002; Giuliodori et al, 2008 and Haberyan and Barnett, 2010) however the ability of collaborative testing to improve content retention is still in question. Some studies report improvement in content retention from collaborative testing (Cortright et al., 2003 and Bloom, 2009) while others do not (Lusk and Conklin, 2003; Woody et al., 2009 and Sandahl, 2010). In this study, we investigated whether collaborative examinations could improve content retention in a large, introductory biology course. Students were semi-randomly divided into two groups based on their performance on the first course exam. Each group took either the second or third course exam in the collaborative format. During collaborative testing, students took their exams individually first and then again as a collaborative group. On the subsequent course exam, students in both groups took a subset of cumulative questions as individuals. Even though group scores were significantly higher than individual scores for the collaborative exams, students who took an exam collaboratively did not score significantly higher on cumulative questions in a subsequent exam than those who took the exam individually.

A Poster 25

Efficacy of a Peer-Led Team Learning Model in Introductory Biology

JASON WILES, *Syracuse University*

Peer-Led Team Learning (PLTL) is an approach to small group instruction that can supplement other traditional components of undergraduate courses. In the PLTL model, students work in small groups of six to eight students led by an undergraduate peer who has previously taken and been successful in the course. Peer leaders are trained in learning theory, pedagogical methods, and the conceptual content of the course in preparation for working collaboratively with the course instructor to facilitate small group problem-solving sessions. Many studies have documented the effectiveness of the PLTL model, but prior research has focused primarily on the academic benefits to the students who have participated in the PLTL workshops. Studies have shown improvement in students' performance, attitudes, retention in the course, conceptual reasoning, and critical thinking skills, yet little attention has been given to the academic benefits for the peer leaders. This study evaluated the effects of the Peer-Led Team Learning (PLTL) instructional model on undergraduate, biology peer leaders' critical thinking skills. As the role of the peer leader involves several factors associated with various aspects of higher-level critical thinking, we hypothesized that participating as a PLTL peer leader should promote gains in critical thinking skills. Herein, we present results and statistical analyses of data obtained via a controlled, quasi-experimental pretest/posttest protocol designed to measure critical thinking gains in PLTL/non-PLTL groups of undergraduates who were qualified and interested in such experiences. Critical thinking was assessed using the California Critical

Thinking Skills Test (CCTST). This study also confirms results of prior research on the benefits of PLTL for student achievement, indicating that students involved in PLTL activities attained significantly and substantially higher scores on final exams and overall course grades.

B Poster 26

BioHUB: Internet HUB for Conceptual Assessment in Biology (CAB) Community

KATHY WILLIAMS, *San Diego State University*

The new BioHUB project is creating an Internet HUB for the growing community of faculty and researchers developing and using Conceptual Assessments in Biology (CABs) to inform curriculum and instruction and transform biology education. Conceptual assessments were first developed in the 1980's (e.g., Force Concept Inventory) and have been effectively used by physicists to implement major changes in introductory physics teaching. This project aims to catalyze CAB developers and users to work toward a common goal of creating a centralized BioHUB where CABs can be obtained by faculty, administered on line, and discussed. The BioHUB is developed in collaboration with "ciHUB" (concept inventory HUB) website creators at Purdue University. Currently ciHUB.org hosts assessments in engineering, physics, and statistics. BioHUB will provide a central and accessible location for CAB information, dissemination, discussion, and research. It will provide college and high school instructors with easy access to CABs, offer assistance with CAB administration and scoring, and help with using CABs in exploring students' prior knowledge, interactive teaching, and assessing learning gains. We are populating the site with CABs now and encourage participation from the biology education community.

A Poster 27

Catalytic Grant 2011: BIOS Biology Boot Camp Replication Hands-on Orientation

BILL WISCHUSEN, *Louisiana State University*, SHERI WISCHUSEN, *Louisiana State University*, MELISSA MICHAEL, *University of Illinois*, MICHELLE WITHERS, *University of West Virginia*

The BIOS program, a one-week academic orientation “boot camp” at Louisiana State University, has been shown to be very effective at improving student success in introductory science courses as well as increasing retention in the major and improving four-year graduation rates at LSU. Can this type of program be effective with a broader group of students from a variety of universities? The University of Illinois at Urbana-Champaign and the University of West Virginia are both large research universities like LSU, but each has a unique student base for which a “boot camp” program could be vital for success. Illinois has similar freshman student issues as LSU, while also serving a large population of transfer students whose graduation rate in the major is no more than 3%. UWV has an even larger gap than LSU in the successful transition of students from high school to college. Drs. Melissa Michael and Michelle Withers have begun preparation for conducting a Biology Boot Camp on each of their campuses that are modeled after LSU’s BIOS. They participated in the first Pearson Education-funded BIOS Workshop in

March 2011, during which they collaborated on mechanisms to translate this program to their departments and students. The Pearson Catalytic Grant Program funding provided a logical next step in their own BIOS preparation. Drs. Michael and Withers attended the LSU BIOS boot camp August 7-12, 2011, and participated by shadowing LSU personnel and interacting with faculty, staff and students during the weeklong program. At the end of each day they participated in a debriefing session to answer questions and to put the days activities into the context of the overall program. They have compiled information to help them tailor the BIOS Model for their students, and ultimately to aid other universities to customize their own BIOS program.

B Poster 28

Authentic Research Experiences for Intro Biology Students, Preliminary Results.

BILL WISCHUSEN, *Louisiana State University*

Involving undergraduate students in authentic research early in their undergraduate curriculum is often associated with higher levels of student retention and success. Is it possible to substitute authentic research experiences for our traditional introductory laboratory courses and would this impact student perceptions of science? During the fall semester 2011 students in two sections of BIOL 1207 (Honors: Introductory Biology Laboratory for Sciences Majors I) were engaged in research involving inserting genes specific to *Chlamydomonas reinhardtii* into gateway vectors for use in future experiments by one of the research labs in the Department of Biological Sciences at LSU. The impact of this research experience on the students' perceptions about science and scientific research were compared to students in two other sections of BIOL 1207 and students in BIOL 1208.

A Poster 29

Microscopy 3.0

SHERI WISCHUSEN, ADRIENNE STEELE, BILL WISCHUSEN,
Louisiana State University

Traditional microscopy is often a solitary or individual experience for students. Additionally it takes a significant amount of practice for the student to become proficient in viewing even the simplest biological specimens. In an effort to combat these problems, LSU faculty and staff have worked with industry for over fifteen years to develop educational applications for hand-held video microscopes (Scope-On-A-Rope). The Scope-On-A-Rope instrument shows focused, magnified images on an ordinary television screen, projector, or computer. It has interchangeable lenses that can achieve magnifications from 1X to more than 200X. Each lens has a specific contact tip that when touched to any object, produces a real time image of the object, automatically lighted and in focus. The next generation of Scope-On-A-Rope (ProScope Mobile) uses a wifi connection allowing up to 253 users to simultaneously view and capture

images using smart phones and tablets (iPhone, iPod touch, iPad). With no wires and a range of over 30 feet, the latest version of Scope-On-A-Rope allows for greater collaboration and mobility.

B Poster 30

Quantitative Learning in Biology Using Peer-Led Learning Groups

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The University of Texas at San Antonio has adopted a new Quality Enhancement Plan (QEP) to address the critical need for students to master quantitative reasoning skills in their core courses. In the Biology department, we wanted to expose students to this type of thinking as early as possible, so we integrated these concepts into the freshman level Biosciences I course. In addition to the lecture portion of the course, students enroll in a much smaller E1-hour weekly Quantitative Learning (QL) section. Each section has a QL Leader, who is an undergraduate student that has been trained in small group facilitation, and 30 students, split into small groups of 4-5 students each. The idea behind the QL section is that students learn by teaching each other. The QL leader is simply there to make sure the groups are staying on track and working cohesively. Each week the students have a series of quantitative biology problems they work together in their small group, and then must explain to the class as a whole. The in-class group learning is vital to their understanding of the material because they must understand the concepts well enough to teach it to their peers. We are currently in our second semester of implementing the QL sessions, and are continually striving to update the content and format of the QLs to fit our students' needs. The poster will describe the organization of the QL sessions and give examples of the weekly QL assignments.